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Indian Standard
SPECIFICATION FOR HARD DRAWN STEEL WIRE FOR UPHOLSTERY SPRINGS
(First Revision)

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Indian Standard

SPECIFICATION FOR HARD DRAWN STEEL WIRE FOR UPHOLSTERY SPRINGS

(First Revision)

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(*Continued on page* 9)

Indian Standard

SPECIFICATION FOR HARD DRAWN STEEL WIRE FOR UPHOLSTERY SPRINGS

(First Revision)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 15 January 1975, after the draft finalized by the Wrought Steel Products Sectional Committee had been approvedby the Structural and Metals Division Council.

0.2 This standard was first published in 1964. As a result of experience gained during these years it has been decided to revise this standard, modifying chemical as well as physical requirements to bring it in line with the present practices being followed in the country in the manufacture of upholstery springs.

0.3 ,This standard covers the requirements for hard-drawn steel wire, both patented and non-patented, intended to be used for upholstery springs. These upholstery springs are used in the manufacture of bed spring units, mattresses, furniture cushions, furniture spring units, automobile seats and back units.

0.4 For the benefit of the purchaser, an informative appendix (*see* Appendix A) giving particulars to be specified while ordering for the wires, has been included.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard covers the requirements for hard drawn steel wire, both patented and non-patented, suitable for the manufacture of upholstery springs.

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*Rules for rounding off numerical values (*revised*).

1.2 Wire to this standard is not intended for use in the manufacture of mechanical springs.

2. SUPPLY OF MATERIAL

2.1 General requirements for the supply of materials shall conform to IS : 1387-1967*.

3. MANUFACTURE

3.1 Steel shall be made by the open-hearth, electric, basic-oxygen, or a combination of these processes. In case any other process is employed in the manufacture, prior approval of the purchaser shall be obtained.

3.2 A sufficient discard shall be made from each ingot to ensure freedom from piping, harmful segregation and other defects.

3.3 The wire shall be cold-drawn to produce the machanical properties as specified in **8**.

4. CHEMICAL COMPOSITION

4.1 The ladle analysis of the steel when analyzed in accordance with IS : 228-1959† shall be as given in Table 1.

TABLE 1 CHEMICAL COMPOSITION

ELEMENT	PERCENTAGE	
	Minimum	Maximum
(1)	(2)	(3)
Carbon	0·45	0·80
Silicon	0·10	0·35
Manganese	0·40	1·00
Sulphur	—	0·050
Phosphorus	—	0·050

NOTE — Any restriction within the specified limits of carbon and manganese shall be permissible subject to agreement between the purchaser and the manufacturer.

---

*General requirements for the supply of metallurgical materials (*first revision*).

†Methods of chemical analysis of pig iron, cast iron and plain carbon and low-alloy steels (*revised*).

4.2 Product Analysis — The permissible variation in the case of product analysis from the limits specified in Table 1 shall be as follows:

Constituent	*Permissible Variation Over Specified Limit, Percent*
Carbon	± 0·03
Manganese	± 0·03
Silicon	± 0·02
Sulphur	+ 0·005
Phosphorus	+ 0·005

5. SIZES

5.1 The standard wire sizes shall be as given in Table 2.

6. TOLERANCES

6.1 The diameter tolerances and ovality of the wire shall not exceed the limits specified in Table 2. The ovality shall be measured as the difference between maximum and minimum dimension at any one cross section.

TABLE 2 STANDARD SIZES, TOLERANCES AND OVALITY

STANDARD SIZE (NOMINAL DIAMETER)	TOLERANCE ON DIAMETER	MAXIMUM OVALITY	TENSILE STRENGTH, N/mm^2	
			Grade I	Grade II
(1)	(2)	(3)	(4)	(5)
mm	mm	mm		
1·20	± 0·02	0·02	1 700/2 000	2 000/2 300
1·30	± 0·02	0·02		
1·40	± 0·02	0·02		
1·50	± 0·02	0·02		
1·60	± 0·02	0·02		
1·70	± 0·02	0·02		
1·80	± 0·02	0·02		
1·90	± 0·02	0·02		
2·00	± 0·03	0·03		
2·10	± 0·03	0·03	1 550/1 750	1 750/1 950
2·25	± 0·03	0·03		
2·50	± 0·03	0·03		
2·65	± 0·03	0·03		
2·80	± 0·03	0·03	1 450/1 650	1 600/1 800
3·00	± 0·03	0·03		
3·10	± 0·03	0·03		
3·25	± 0·03	0·03		
3·35	± 0·03	0·03		
3·55	± 0·03	0·03		
4·00	± 0·03	0·03	1 450 *Min*	

NOTE — 1N/mm^2 = 1MN/m^2 = 0·102 0 kgf/mm^2.

7. SELECTION OF TEST SAMPLES

7.1 Test samples of appropriate length for all the specified tests shall be taken from both ends of each coil of wire and shall be properly identified with the coil from which the lengths have been cut.

8. PHYSICAL TESTS

8.1 Tensile Test — The tensile strength of wire when tested in accordance with IS : 1521-1972* shall be as given in Table 2.

8.2 Wrapping Test (for Patented Wire) — When tested in accordance with IS : 1755-1961† the wire shall be capable of being wrapped at least 2 turns around its own diameter, without fracture.

8.3 Torsion Test (for Patented Wire) — The torsion test shall be carried out in accordance with IS : 1717-1971‡. The test pieces shall withstand, without sign of failure, the following number of turns in a length equivalent to 100 diameters:

Wire Diameter mm	*Number of Turns*
Under 2·25	20
2·25 and over	15

8.4 Coiling Test (for Non-Patented Wire) — Test pieces shall withstand, without fracture, being wrapped once round a former equal to its own diameter.

8.5 Reverse Bend Test (for Patented Wire) — The reverse bend test shall be carried out in accordance with IS : 1716-1971§, The test piece shall, without sign of failure, withstand, being bent backwards and forwards three times through 180° over a radius equal to three times the wire diameter; the first bend of 90° not being counted.

9. WORKMANSHIP

9.1 The wire shall be free from any kink. A few pieces of wire shall be cut from the bundle and placed on a flat surface, the wire shall lie substantially flat on itself and not spring up or show a wavy condition.

10. FREEDOM FROM DEFECTS

10.1 Finished wire shall be free from harmful defects.

---

*Method for tensile testing of steel wire (*first revision*).

†Method for wrapping test of wire.

‡Method for simple torsion testing of steel wire (*first revision*).

§Method for reverse bend testing of steel wire (*first revision*).

11. FINISH

11.1 The wires shall be supplied in smooth unoiled phosphate-drawn condition, unless otherwise specified. The wire may be supplied with the galvanized or other coating when so specified by the purchaser on his order. The coating requirement shall be subject to agreement between the manufacturer and the purchaser.

12. PACKING AND MARKING

12.1 Each coil or bundle of wire shall be bound and fastened compactly, legibly marked with the size, weight, physical condition, trade-mark or name of the manufacturer on a metal tag securely attached to each bundle of wire.

12.1.1 The material may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well-defined system of inspection, testing and quality control which is devised and supervised by ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

13. SAMPLING

13.1 Lot — All the steel wires of the same diameter and grade manufactured in a single batch shall constitute a lot. For the purpose of this standard a lot shall not contain more than 200 coils.

13.2 Sampling and Criteria for Conformity of Coils for Workmanship, Finish and Dimensional Tolerances — At least 25 percent of the coils in the lot, subject to minimum of 5, shall be selected from each lot for checking workmanship, finish and dimensions. These coils shall be drawn at random by using random number tables (*see* IS : 4905-1968*). The criteria for conformity for acceptance of the lot with respect to the above characteristics shall be as follows:

Sample Coils Checked	*Defective Coils, Maximum*
Up to 8	0
9–15	1
16–25	2
26–35	3
36–50	4

---

*Methods for random sampling

13.3 Sampling and Criteria for Conformity for Physical Tests — The sample pieces for conducting various physical tests given in **8** shall be selected according to Table 3. The test pieces may be taken from either end of the coil after rejecting 200 mm, maximum, from each end for conducting the physical tests.

TABLE 3 SAMPLING AND CRITERIA FOR CONFORMITY FOR PHYSICAL TESTS

No. of Coils in the Lot (1)	No. of Sample Pieces for Each of the Physical Tests (2)	Acceptance Number (3)
Up to 50	2	0
51 ,, 100	3	0
101 ,, 150	4	0
151 ,, 200	5	1

13.3.1 The sample pieces collected in accordance with col 2 of Table 3 shall be tested successively for each of the physical characteristics specified in **8**. The number of defective test pieces in respect of each of the physical tests shall not exceed the corresponding acceptance number given in col 3 of Table 3 in respect of these characteristics.

APPENDIX A

(*Clause* 0.4)

INFORMATION TO BE GIVEN BY THE PURCHASER

A-1. BASIS FOR ORDER

A-1.1 While placing an order for the purchase of wires, covered by this standard, the purchaser should specify the following:

a) Description regarding size, length, grade, etc.
b) Condition of delivery.
c) Finish.
d) Tests required.
e) Method of manufacture.
f) Any special requirements.
g) Test report, if required.

(Continued from page 2)

Panel for Spring Steel, SMDC 5 : P18

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AMENDMENT NO. 1 APRIL 1975

TO

IS : 2589 - 1975 SPECIFICATION FOR HARD DRAWN STEEL WIRE FOR UPHOLSTERY SPRINGS

(*First Revision*)

The Ministry of Industrial Development, Government of India, in Gazette Notification No. S. O. 294(E)/IDRA/29B/1/74/7 dated 16 May 1974, has allowed the various mini steel plants and electric furnace units to diversify their products and to obtain the ISI licence to cover such products under the ISI Certification Marks Scheme. Most of these manufacturing units will be initially making ingots [including cast billet ingots, for definition refer to IS : 6914-1973 Specification for carbon steel cast billet ingots for rolling into structural steel (standard quality)] or billets for further rolling into finished products. It is, therefore, felt that till such time as separate specifications are formulated for these, provision should be made to include ingots and billets in this specification.

The clauses in this specification which refer only to the end products shall not apply to ingots and billets.

Addenda

(*Page* 4, *clause* **1.2**) — Add the following new clause after **1.2**:

' **1.3** This standard also covers the requirements for ingots and billets for the production of hard drawn steel wire for upholstery springs.'

(*Page* 5, *clause* **6.1**) — Add the following new clause after **6.1**:

' **6.2** The tolerances for cast billet ingots and billets shall be as given in IS : 6914-1973* and IS : 2830-1975† respectively, the tolerances for ingots of other sizes shall be subject to mutual agreement between the purchaser and the manufacturer. '

(*Page* 5, *clause* **6.2**) — Add the following foot-notes after the new clause **6.2**:

' *Specification for carbon steel cast billet ingots for rolling into structural steel (standard quality).

†Specification for carbon steel billets, blooms and slabs for re-rolling into structural steel (standard quality) (*first revision*). '

(*Page* 6, *clause* 9.1) — Add the following new clause after 9.1:

'9.2 Ingots and billets shall be sound and cleanly cast to the specified dimensions. They will be free from harmful defects, such as cracks; laminations; rough, jagged and imperfect edges; exposed piping and heavy refractory inclusions.'

(*Page* 7, *clause* 12.1) — Add the following new clause after 12.1 and re-number the subsequent clause:

'**12.1.1** Each ingot and billet shall be legibly stamped or painted with cast number and the name or trade-mark of the manufacturer,'

(SMDC 5)

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